Common antibiotics in Adult GIM

General Antibiotic Spectrum						
Antibiotics			**Gram+**	**Gram-**	**Anaerobe**	**Comments**
IV		**PO**				
Penicillins						
Penicillin G		Penicillin VK	✓	±	±	∅staph; ↑resistance to S.pneum; ✓syphilis, listeria, oral anaerobes
Cloxacillin		Cloxacillin	✓			Improved against staph; ✓MSSA
Ampicillin		Amoxicillin Amoxi-Clav	✓	±	(✓ amoxi-clav)	Improved against gram-. ✓enterococcus faecalis, β-lactamase inhibitor ↑spectrum
Piperacillin/Tazo			✓	✓	✓	Broad spectrum, ∅ atypicals, ✓pseudomonas
Cephalosporins						
1st gen	Cefazolin	Cephalexin	✓	±		Mostly gram+, ✓MSSA
2nd gen	Cefuroxime	Cefuroxime	✓	✓		↑gram-; ✓S.pneum (but ↑resistance)
3rd gen	Ceftriaxone		✓	✓		Extended gram-; ✓S.pneum, ✓CNS infxn
	Cefotaxime		✓	✓		Extended gram-; ✓S.pneum (used in peds)
	Ceftazidime		±	✓		Poor gram+, ∅MSSA. ✓Pseudomonas
		Cefixime	±	✓		Poor gram+(but ✓β-haemolytic strep), tx UTI
4th gen	Cefepime		✓	✓		Not commonly used, ✓Pseudomonas
Carbapenems						
Imipenem			✓	✓	✓	↑gram+, ∅ atypicals
Meropenem			✓	✓	✓	↑gram-, ∅ atypicals, ✓CNS infxn
Ertapenem			✓	✓	✓	∅ atypicals, ∅pseudomonas, enterococcus, or acinetobacter
Amioglycosides						
Gentamicin			Synergy	✓		synergy for staph, strep, enterococcus
Tobramycin			Synergy	✓		more potent than gent for pseudomonas
Amikacin			Synergy	✓		
Macrolides						
Erythromycin		Erythromycin	✓	±		✓atypicals, STDs, poor against H.influenzae
		Clarithromycin	✓	±		✓atypicals, STDs
Azithromycin		Azithromycin	✓	±		✓atypicals, STDs
Quinolones						
Ciprofloxacin		Ciprofloxacin	✓ (±)	✓		✓atypicals & pseud.; ↑E.coli resistance
Levofloxacin		Levofloxacin	✓	✓		✓atypicals, TB; better for S.pneum vs cipro
Moxifloxacin		Moxifloxacin	✓	✓ (±)	✓	✓atypicals, TB; ∅pseudomonas
Others						
		Nitrofurantoin	✓	✓		Tx uncomplicated UTIs with CrCl>60
TMP/SMX		TMP/SMX	✓	✓		✓some ca-MRSA, PJP, steno
Doxycycline		Doxycycline	✓	±		✓atypicals; ✓some ca-MRSA; ↑resistance
Clindamycin		Clindamycin	✓		✓	✓some ca-MRSA
Metronidazole		Metronidazole			✓	Best for anaerobes; dosed TID for C.diff
Vancomycin		Vancomycin	✓			✓MRSA, E.faecium; oral for C.diff only
Linezolid		Linezolid	✓			✓MRSA, E.faecium, VRE; expensive
Tigecycline			✓	✓	✓	✓MRSA, E.faecium, VRE; ∅pseudomonas
Daptomycin			✓			✓MRSA, E.faecium, VRE; ∅pulm infections
Aztreonam				✓		Only gram- rods (similar to AG)
Colistimethate (Colistin)				✓		✓MDR pseudom/acinebacter; IV/inhaled

ca-MRSA=community-acquired MRSA Local resistance patterns: antibiogram.ca

Antibiotics that cover:

Pseudomonas—piperacillin, pip-tazo, ticarcillin, ceftazidime, cefepime, ciprofloxacin, levofloxacin (not reliable), meropenem, imipenem, gentamicin, tobramycin, amikacin, aztreonam, colistin

ESBL—aminoglycosides, ciprofloxacin, TMP/SMX, carbapenems, tigecycline

SPICE organisms—aminoglycosides, quinolones, TMP/SMX, carbapenems, tigecycline, aztreonam

Note: this table provides examples of commonly used products, but is not a comprehensive table.

References: Bugs and Drugs 2012, Sanford Guide to Antimicrobial Therapy 2015

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Common antibiotics in Adult GIM

MRSA—vancomycin, linezolid, daptomycin, tigecycline, clindamycin, TMP/SMX, doxycycline

Adult Therapeutic Drug Monitoring

Vancomycin IV

Dose

- Loading dose: 25-30mg/kg x 1 (use for severe infections where rapid attainment of target trough level is desired or significant renal dysfunction in order to decrease time to target trough level)
- Maintenance dose: **15mg/kg** (max 2g/dose)
- Calculate dose using **actual body wt**

Dosing interval

Calculated CrCl (mL/min)	Dosing interval for trough 10-20mg/L	Dosing interval for trough 15-20mg/L
≥80	q12h	q8h
30-80	q24h	q12h
10-30	q48h	q24-48h
<10	Consider loading dose	Consider loading dose

Target trough levels

- 15-20mg/L for: osteomyelitis, pneumonia, CNS infections, endocarditis, bacteremia, MRSA infections
- 10-20mg/L for: all other infections

When to take trough levels

- Do NOT need levels if: stable renal function, duration of therapy <7days, and simple empiric treatment
- Important: it takes time (3-5 t½) to reach steady state concentration!
- Pre-4th or 5th dose if q8-12h, pre-3rd dose if q24-48h
- Subsequent once weekly levels if at target and stable renal function

Monitoring

- Weekly Cr (more frequent if unstable) and CBC-D
- Red-man syndrome, nephrotoxicity (rare), ototoxicity

Gentamicin/Tobramycin IV

<table>
<tr><th></th><th>High Dose Extended Interval (HDEID)</th><th>Conventional</th><th>Synergy</th></tr>
<tr><td>When to use</td><td>Most patients</td><td>Hemodialysis, rapid clearance of drug (e.g. burns, CF), endocarditis, surgical prophylaxis</td><td>Gram+ infections</td></tr>
<tr><td>Dose</td><td>7mg/kg (IBW or DW)</td><td colspan="2">1.5-2mg/kg (IBW or DW)</td><td>1mg/kg (IBW or DW)</td></tr>
<tr><td>Dosing interval</td><td>q24-48h
Adjust as per Hartford Nomogram</td><td colspan="2"><table><tr><th>CrCl (mL/min)</th><th>Dosing interval</th></tr><tr><td>≥80</td><td>q8h</td></tr><tr><td>50-80</td><td>q12h</td></tr><tr><td>20-50</td><td>q24h</td></tr><tr><td><20</td><td>Use levels to adjust</td></tr></table></td></tr>
<tr><td>Target levels</td><td>No target, adjust dosing interval as per Harford Nomogram. If level is off the nomogram, change to conventional dosing</td><td colspan="2"><table><tr><th>Infection</th><th>Peak (mg/L)</th><th>Trough (mg/L)</th></tr><tr><td>Synergy for Gram+ infxn</td><td>N/A</td><td><1</td></tr><tr><td>Lower UTI</td><td>3-4</td><td><1</td></tr><tr><td>PID/chorioamnionitis, pyelonephritis, peritonitis, soft tissue</td><td>6-7</td><td><2</td></tr><tr><td>Sepsis, neutropenia, burns, pneumonia, pseudomonas (∅UTI)</td><td>8-11</td><td><2</td></tr><tr><td>CF</td><td>12-15</td><td><2</td></tr></table></td></tr>
<tr><td>When to take levels</td><td>8 hrs post first dose</td><td>Pre & post levels with 4th or 5th dose</td><td>Trough level pre 4th or 5th dose</td></tr>
</table>

Monitoring

- Nephrotoxicity: Cr 2-3x/week
- Ototoxicity: baseline audiometry testing, cochlear and/or vestibular signs and symptoms

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